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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/602,675

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Sang-Min Jang

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EXAMINER

NGUYEN, THANH NHAN P

ART UNIT

PAPER NUMBER

2871

DATE MAILED: 09/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/602,675

Applicant(s)

JANG ET AL.

Examiner

(Nancy) Thanh-Nhan P Nguyen

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9-13, 15 and 24-28 is/are allowed.
- 6) ☒ Claim(s) 1-8, 14 and 16-23 is/are rejected.
- 7) ☒ Claim(s) 3, 9 and 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9/22/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### **Drawings**

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "190" in figure 13. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### **Specification**

The disclosure is objected to because of the following informalities: on page 20, the paragraph below is twice repeated.

"The buffer layer 204 has a specific thickness "k" to form a step in the color filter layer 206. For example, the thickness "k" of the buffer layer 204 may be within a range of about 2.5  $\mu\text{m}$  to about 4.0  $\mu\text{m}$  to make a step of the color filter layer 206 within a range of about 2.0  $\mu\text{m}$  to about 2.5  $\mu\text{m}$ ."

Appropriate correction is required.

**Claim Objections**

Claim 3 is objected to because of the following informalities:

Claim 3 presently read as "The array substrate according to *claim 3*, wherein the reflective layer has a rectangular shape" which the examiner suggests it should be rewritten to " The array substrate according to *claim 1*, wherein the reflective layer has a rectangular shape."

Appropriate correction is required.

Claims 9, 24 are objected to because of the lack of antecedent basis for "the semiconductor layer", and the semiconductor layer had not previously been mentioned in the claim, what was stated earlier in the claim was an "active layer".

Appropriate correction is required.

**Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

**Claims 1-7 are rejected under 35 U.S.C. 102(a) as being anticipated by Sakamoto et al U.S. Patent Application Publication No. 2003/0030768.**

Referring to claim 1, Sakamoto et al teaches an array substrate for a transreflective liquid crystal display device, comprising: a gate line 1 on a substrate 12; a common line 4 parallel to and spaced apart from the gate line; a data line 2 crossing the gate line to define a pixel region having a transmissive portion and a reflective portion wherein the reflective portion includes an area between the common line and the gate line; a capacitor electrode 2c extending from the drain electrode and overlapping the common line; a reflective layer 6 covering the common line and the thin film transistor and corresponding to the reflective portion; and a transparent electrode 5 connected to the drain electrode and disposed in the pixel region, a thin film transistor 3 connected to the gate and data lines, the thin film transistor including a gate electrode 1a, an active layer, and source and drain electrodes [see page 5, paragraph 0061, and figures 1-2].

Sakamoto et al does not show the active layer on figure 2, however, the active layer is inherent with thin film transistor. The thin film transistors that are fabricated by consecutive deposition of the gate, drain and source electrodes and the gate insulator have to have and the semiconductor channel material in the region between the source electrode and drain electrode and overlapping the gate. Otherwise, the device would not function as a transistor.

Referring to claim 2, Sakamoto et al teaches the reflective layer is adjacent to the gate line, [see figure 1].

Referring to claim 3, Sakamoto et al teaches the reflective layer has a rectangular shape, [see figure 1].

Referring to claim 4, Sakamoto et al teaches the transparent electrode contacts the capacitor electrode, [see figure 2].

Referring to claim 5, Sakamoto et al teaches the reflective layer is uneven, [see figure 2].

Referring to claim 6, Sakamoto et al teaches the reflective layer includes one of silver (Ag), aluminum (Al), and aluminum-neodymium (AlNd), [see page 5, paragraph 0061].

Referring to claim 7, Sakamoto et al teaches the transparent electrode includes one of indium-tin-oxide (ITO) and indium-zinc-oxide (IZO), [see page 5, paragraph 0061].

**Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamoto et al in view of Ha et al U.S. Patent Application Publication No. 2003/0058389.**

As Sakamoto et al discloses above, Sakamoto et al lacks of disclosing an insulating layer having an open portion corresponding to the transmissive portion.

Ha et al teaches the insulating layer (third insulating layer 353) having an open portion (the transmission groove 357) corresponding to the transmissive portion (transmissive hole "A") for the benefit of having a color difference between a transmissive portion and a reflective portion becomes small, and display quality is improved, [see page 6, paragraph 0070, and figure 10D].

Therefore, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use the insulating layer in the array substrate having an open portion corresponding to the transmissive portion for the benefit of having a color difference between a transmissive portion and a reflective portion becomes small, and display quality is improved.

**Claim 14, 16-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamoto et al in view of Ha et al as applied above, and further in view of Kim et al U.S. Patent No. 6,522,377.**

Referring to claim 14, further, Sakamoto et al also discloses a transfective liquid crystal display device comprising first substrate 12, and second substrate 16 spaced apart from each other; a common electrode 15 on the color filter layer 14; a liquid crystal layer 17 between the transparent electrode and the common electrode, [see figure 2].

However, Sakamoto et al lacks of having a black matrix on an inner surface of the second substrate; a buffer layer on the black matrix, the buffer layer being transparent and corresponding to the reflective portion; a color filter layer on the buffer layer in the pixel region, the color filter layer having a first thickness in the transmissive

portion and a second thickness in the reflective portion, the first thickness being substantially twice of the second thickness.

Kim et al teaches a black matrix 61 on an inner surface of the second substrate 10; a buffer layer 64 on the black matrix, the buffer layer being transparent and corresponding to the reflective portion; a color filter layer 62 on the buffer layer in the pixel region, the color filter layer having a first thickness in the transmissive portion, and a second thickness in the reflective portion, the first thickness being substantially twice of the second thickness, [see column 4, lines 18-46, and figures 2-3], for the benefit of involving the same color purity in transmissive area and reflective area, [see page 3-4, paragraph 0058].

Therefore, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have a black matrix on an inner surface of the second substrate; a buffer layer on the black matrix, the buffer layer being transparent and corresponding to the reflective portion; the color filter layer on the buffer layer, the color filter layer having a first thickness in the transmissive portion substantially twice of a second thickness in the reflective portion for the benefit of improving the same color purity in transmissive area and reflective area.

Referring to claim 16, Sakamoto et al lacks of disclosing the liquid crystal layer has a third thickness in the transmissive portion and a fourth thickness in the reflective portion, wherein the third thickness is substantially twice of the fourth thickness.



Kim et al teaches the liquid crystal layer has a third thickness  $d_1$  in the transmissive portion and a fourth thickness  $d_2$  in the reflective portion, wherein the third thickness is substantially twice of the fourth thickness, [see column 7, lines 24-27, and figure 5], for the benefit of providing the same efficiency for rays of light.

Therefore, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have the thickness in transmissive portion substantially twice the thickness in reflective portion in liquid crystal layer for the benefit of providing the same efficiency for rays of light.

Claims 17-23 are met the discussion regarding claims 1-7 rejection above.

**Allowable Subject Matter**

Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 9-13 and 24-28 are allowable.

The following is a statement of reasons for the indication of allowable subject matter: None of prior art taught or disclosed the buffer layer extends to a reflective portion of an adjacent pixel region, and the way of forming the layers in transfective liquid crystal device such as forming a second insulating layer on the source and drain electrodes, the data line and the capacitor electrode; forming a reflective layer on the second insulating layer, the reflective layer covering the common line and the thin film

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transistor; forming a third insulating layer on the reflective layer; forming a transparent electrode on the third insulating layer in the pixel region, the transparent electrode being connected to the drain electrode; forming a plurality of bumps on the second insulating layer in the pixel region; and forming a fourth insulating layer on the plurality of bumps.

### **Conclusion**

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sakamoto et al U.S. Patent Application Publication No. 2003/0030768 discloses the reflective layer having uneven shape and covering the common line and the thin film transistor and corresponding to the reflective portion for the benefit of improving the display quality.

Ha et al U.S. Patent Application Publication No. 2003/0058389 disclose an insulating layer having an open portion corresponding to the transmissive portion for the benefit of having a color difference between a transmissive portion and a reflective portion becomes small, and display quality is improved.

Kim et al U.S. Patent No. 6,522,377 discloses the color filter thickness and the cell gap in transmissive portion is substantially twice the color filter thickness and the cell gap in reflective portion for the benefit of improving the same color purity, and providing the same efficiency for rays of light in transmissive portion and reflective portion.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to (Nancy) Thanh-Nhan P Nguyen whose telephone number is 571-272-1673. The examiner can normally be reached on M-F/9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

(Nancy) Thanh-Nhan P Nguyen  
Examiner  
Art Unit 2871

A handwritten signature in black ink, appearing to be 'K. Parker', with a long horizontal flourish extending to the right.

**KENNETH PARKER  
PRIMARY EXAMINER**